Remarks/Arguments

These remarks are in response to the Office Action dated November 15, 2006. This reply is timely filed. At the time of the Office Action, claims 1-17 were pending in the application. Claims 1-3, 6, 7 and 17 have been rejected under 35 U.S.C. §102(e). Claims 8-12, 15 and 16 have been rejected under 35 U.S.C. §103(a). Claims 4, 5, 13 and 14 have been objected to as being dependant upon a rejected base claim, but were indicated as allowable if rewritten in independent form including all of the limitation of the base claim and any intervening claims. These claim rejections are set out in more detail below.

I. Claim Objections

Applicant notes with appreciation that the Examiner has indicated claims 4, 5, 13 and 14 would be allowable if rewritten in independent form, including all of the limitations of their respective base claims and any intervening claims. In response, claims 4 and 13 have been amended to place them in independent form including all of the limitations of their respective base claims and any intervening claims. As such, Applicant believes that the claims 4 and 13 are in condition for allowance. Applicant also believes that the claims 5 and 14 are in condition for allowance on the basis of their dependence upon an allowable base claim.

II. Brief Review of Applicants' Invention

Prior to addressing the Examiner's rejections on the art, a brief review of applicants' invention is appropriate. The invention concerns a method and apparatus for achieving high fidelity hearing restoration. The method includes the steps of selecting a series of audio tones within the normal range of hearing and then measuring a relative sensitivity of a test subject with respect to the ability to hear each of the audio tones, exclusive of the effects of tinnitus. The relative sensitivity of the test subject to hear the tones can be measured by determining for each tone an intensity necessary for the test subject to hear the tones at a subjectively equal loudness level. The intensity of the subjectively equal loudness level can advantageously be selected to exceed a perceived level of noise attributable to tinnitus for the test subject. The method can also include the step of determining a difference between the intensity measured for each of the tones and an

intensity predicted by a standard loudness contour for each of the tones. For example, the standard loudness contour can be a Fletcher-Munson Loudness Contour.

III. Claim Rejections Under 35 U.S.C. §102(e)

Claims 1-3, 6, 7 and 17 have been rejected under 35 U.S.C. §102(e) as being anticipated by U.S. Patent Application Publication 2004/0141624 to Davis, et al.

Brief Review of Davis, et al.

The Davis reference discloses a method and device for providing relief to a person suffering from the effects of tinnitus. The method includes performing a standard audiometric procedure (i.e., a hearing test) to obtain a test subject's hearing threshold values expressed in decibel hearing levels (dB HLs). (*See* column 11, paragraph 68). Thereafter, the test subject's hearing threshold values are converted from dB HLs to decibel sound pressure levels (dB SPLs) by an addition of defined transfer values. (*See* column 11, paragraph 68-69). The defined transfer values can be selected as Equal Loudness Contour transfer values (e.g., 40 Phon contour values). (*See* column 11, paragraph 69). Subsequently, a plurality of steps are performed using the test subject's hearing threshold values expressed in dB SPLs for setting a graphic equalizer with a test subject's left and right ear required equalization response. (*See* column 11, paragraph 70-80; and column 12, paragraphs 81-84). A tinnitus rehabilitation sound (e.g., noise or music) recording is produced for use in a personal music player. (*See* column 8, paragraph 60). This sound recording production involves passing an audio signal through the graphic equalizer before being recorded thereby creating a modified sound recording. (*See* column 8, paragraph 60).

Independent Claim 1

Independent claim 1 concerns a method for measuring hearing loss (i.e., a hearing test). The method includes the steps of selecting a series of audio tones within the normal range of hearing and measuring a relative sensitivity of a test subject with respect to the ability to hear each of the audio tones, exclusive of the effects of tinnitus. The Davis reference fails to teach the step of measuring a relative sensitivity of a test subject with

respect to the ability to hear each of the audio tones, exclusive of the effects of tinnitus. In this regard, it should be appreciated that the Davis reference teaches the performance of a standard audiometric procedure (i.e., a hearing test) for measuring hearing loss. (*See* column 11, paragraph 68). It is well known in the art that a standard audiometric procedure typically includes the steps of selecting a series of audio tones within the normal range of hearing and measuring a relative sensitivity of a test subject with respect to the ability to hear each of the audio tones. However, rather than excluding the effects of tinnitus, such a "hearing threshold" test (see Davis et al., ¶68) inherently <u>includes</u> the effect of tinnitus. The reason for this deficiency is that tinnitus directly affects the hearing threshold level at certain frequencies. In fact, this is precisely the problem with conventional hearing testing procedures that Applicant's claimed invention has overcome. In contrast, Applicant claims a method which measures a subject's hearing sensitivity <u>exclusive</u> of the effects of tinnitus.

The Examiner concedes that Davis et al. performs a standard audiometric procedure. However, the Examiner contends that this deficiency is cured by a subsequent process described in paragraph [0082] of Davis et al. That process involves adding certain calibration values to the measurements described in paragraph [0068]. According to Davis et al., this produces "a measure of hearing in terms of the relative perceived loudness of stimuli at each of the discrete frequencies." See Davis et al. ¶82.

In response, Applicant notes that Davis et al.'s measurement process followed by a correction step to remove an error is not the same as performing the measurement directly without including the error. Aside from this important difference, however, it is apparent that Davis et al. does not ultimately measure a relative sensitivity of a test subject with respect to the ability to hear audio tones, <u>exclusive of the effects of tinnitus</u>. In fact, Davis et al. does not make such a claim. Instead, Davis et al. merely states that the procedure produces "a measure of hearing in terms of the relative perceived loudness of stimuli at each of the discrete frequencies." See Davis et al. ¶¶ [0082].

Notwithstanding the foregoing, the Examiner contends that "as taught in paragraph 67, the equal loudness contour is selected to be exclusive of the effects of tinnitus." Office Action, p. 2. However, Applicant can find no such teaching in the referenced paragraph. Instead, the language in paragraph 67 merely states that a particular loudness curve was selected to correct for differences in loudness perception depending on the discreet frequencies. In fact, the loudness curve actually chosen in Davis et al. was determined

based on an earlier study which identified an average (mean) loudness level where tinnitus was intermittently masked. Merely choosing a loudness curve based on an average masking level does not suggest that the resulting measurement procedure measures a relative sensitivity of a test subject with respect to the ability to hear audio tones, exclusive of the effects of tinnitus. The disclosure in Davis et al. simply does not support such a teaching. Accordingly, Applicant requests reconsideration of the Examiner's rejection of claim 1.

Independent Claim 17

Davis et al. also fails to disclose the invention recited in independent claim 17. Similar to claim 1, independent claim 17 concerns a method for measuring hearing loss. The method includes the steps of selecting a series of audio frequencies within the normal range of hearing and measuring a test subject's loss of hearing at each frequency attributable exclusively to dispersion in the hearing channel. However, it will be appreciated that measuring hearing loss "attributable exclusively to dispersion in the hearing channel" is simply a different way of stating that the measurement is performed "exclusive of the effects of tinnitus". Hearing loss is caused by dispersion in the hearing channel and by tinnitus. If a measurement is performed so as to only measure the dispersion, then the measurement is performed exclusive of the affects of tinnitus. Accordingly, claim 17 is believed to be patentable over Davis et al. for the same reasons as set forth above with regard to independent claim 1. Accordingly, Applicant requests reconsideration of the Examiner's rejection of claim 17.

IV. Claim Rejections Under 35 U.S.C. §103(a)

Claims 8-12, 15 and 16 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Davis, et al., in view of U.S. Patent No. 4,680,798 to Neumann. Claim 8 is dependent on independent claim 1, which has been discussed above. The remaining dependent claims rejected by the Examiner are based on independent claim 9 or 15. However, each of these claims recites the step of measuring a test subject's loss of hearing attributable exclusively to dispersion in the hearing channel. As explained above with

regard to claims 1 and 17, this feature is not taught by the Davis et al. reference. Moreover, this deficiency in Davis et al. is not cured by the disclosure or Neumann.

The Neumann reference discloses a hearing aid. The hearing aid is comprised of a microphone for receiving an audio signal, preamplifiers for amplifying the received audio signal, and active band pass filters for separating the audio signal into a plurality of bandwidths. (*See* column 4, lines 50-55). The hearing aid is also comprised of digitally controllable, variable gain amplifiers for increasing the gain of a respective bandwidth. (*See* column 4, lines 61-63). The amplified bandwidths are summed together to form a spectrally modified output signal. (*See* column 5, lines 3-8). Significantly, however, Neumann does not teach or suggest the step of measuring a test subject's loss of hearing attributable exclusively to dispersion in the hearing channel.

Aside from the foregoing distinctions, claims 9 and 15 further recite the step of setting for each frequency band of a hearing aid device an audio gain level to compensate exclusively for the dispersion in the hearing channel. This step is not taught in Davis et al. or Neumann. In fact, neither of those cited references discloses or teaches how to determine a gain level to compensate for a hearing loss due exclusively to such dispersion. Given that the references do not teach the claimed measurement, it will be readily appreciated that such references also fail to teach setting a gain level for a hearing aid device based on such a measurement.

As noted above, Neumann discloses a hearing aid device in which audio gain levels for frequency bands can be set. However, Neumann fails to disclose or teach measuring a test subject's loss of hearing attributable *exclusively* to dispersion in the hearing channel and setting for each frequency band of the hearing aid device an audio gain level to compensate *exclusively* for the dispersion. Instead, Neumann discloses and teaches storing bandwidth interdependent, frequency response information in a memory of the hearing aid. (*See* column 3, lines 14-19). This information is provided for use in determining and setting gain levels of variable gain amplifiers for increasing the gain of a respective bandwidth. Neumann further discloses and teaches a hearing aid device having a means for introducing noise into a signal including amplified bandwidths for providing treatment for tinnitus. (*See* column 3, lines 3-8). This noise is referred to in the art of audiology as background or "white" noise which reduces the effects of tinnitus. Accordingly, a person skilled in the art is left to interpret Neumann as disclosing and teaching performing

a "standard audiometric procedure" to obtain the bandwidth interdependent, frequency response information required to set audio gain levels for frequency bands since the effects of tinnitus are still present in the signal including amplified bandwidths and are dealt with by introducing "white" noise into the signal.

In view of the forgoing, the combination of Davis and Neumann fails to disclose and teach the steps recited in claims 9 and 15. As such, Applicants respectfully request reconsideration and prompt allowance of the pending claims 9 and 15.

Independent Claim 16

Claim 16 relates to a hearing aid device for a person suffering from tinnitus. Claim 16 recites an audio amplification device having a plurality of audio frequency bands with selectable gain levels. Each of the gain levels is set for producing a predetermined amount of audio gain set to compensate *exclusively* for dispersion losses in the hearing channel.

In view of the discussion concerning claims 1 and 17, it is readily apparent that Davis does not disclose or teach an audio amplification device having a plurality of audio frequency bands with selectable gain levels set to compensate *exclusively* for dispersion. Similarly, Neumann fails to disclose and teach a hearing device having gain levels set for producing a predetermined amount of audio gain set to compensate *exclusively* for dispersion losses in the hearing channel. In this regard, it should be appreciated that Neumann teaches a hearing aid device having a means for introducing noise into a signal including amplified bandwidths for providing treatment for tinnitus. (*See* column 3, lines 3-8). This noise is referred to in the art of audiology as background or "white" noise which reduces the effects of tinnitus. Accordingly, a person skilled in the art is left to interpret Neumann as disclosing and teaching performing a "standard audiometric procedure" to obtain the bandwidth interdependent, frequency response information required to set audio gain levels for frequency bands. As such, Neumann discloses and teaches a hearing device having gain levels set for producing a predetermined amount of audio gain set to compensate for dispersion losses in the hearing channel and noise attributable to tinnitus.

In view of the forgoing, the combination of Davis and Neumann fails to disclose and teach the features recited in claim 16. As such, Applicants respectfully request reconsideration and prompt allowance of the pending claim 16.

V. Conclusion

Applicants have made every effort to present claims which distinguish over the prior art, and it is believed that all claims are in condition for allowance. Nevertheless, Applicants invite the Examiner to call the undersigned if it is believed that a telephonic interview would expedite the prosecution of the application to an allowance. In view of the foregoing remarks, Applicants respectfully request reconsideration and prompt allowance of the pending claims.

Respectfully submitted,

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